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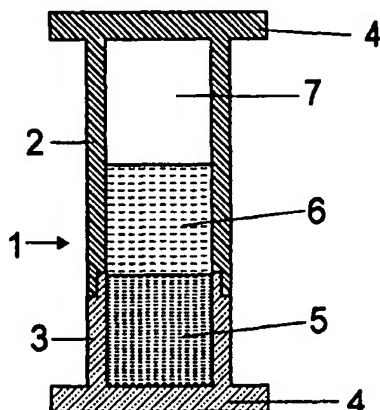
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(54) Title: FREEZER FAILURE INDICATOR



(57) Abstract: A freezer failure indicator is provided for indicating if a freezer which has been unattended was off for a significant period of time. The indicator comprises a closed container (1) defined by walls forming an internal cavity containing both a quantity of a first liquid (5) having a freezing point selected so that it will be frozen at normal operating temperatures of a freezer with which it is to be used and a generally roughly equal quantity of a second liquid (6) substantially immiscible with the first liquid and selected to remain in a liquid state at normal operating temperatures of the freezer. The two liquids are of distinctly different colours, typically red and green. The walls of the container have an opaque zone (2) and a transparent zone (3) arranged to enable the first liquid to be pre-frozen within the opaque zone followed by orientating the container to render the second liquid visible through the transparent zone of the wall. In the event of a freezer failure the first liquid thaws and displaces the second liquid in the transparent zone.

## **FREEZER FAILURE INDICATOR**

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### **FIELD OF THE INVENTION**

This invention relates to a freezer failure indicator by which term is meant an indicator capable of indicating whether or not a freezer, particularly a freezer  
10 used for the storage of foodstuffs, but not necessarily so, has failed during a time period under review to the extent that the contents may have thawed, at least to some extent, and then re-frozen after the cause of the failure had become rectified.

### **15 BACKGROUND TO THE INVENTION**

It is a regular problem for persons vacating premises at which a freezer is located for what may be a relatively long period of time to be certain that, during that time period, the freezer had not failed for whatever reason,  
20 usually power failure reasons, for a period of time sufficiently long to enable the contents of the freezer to thaw at least to some extent and then re-freeze once the cause of the failure had become rectified.

Freezer failure of the type under consideration can have extremely dire  
25 consequences in that frozen food may have partially or completely thawed for some period of time during which it could develop harmful bacteria or the like after which it becomes re-frozen once the freezer is functional once more. Persons could thus unknowingly consume tainted food and become poisoned by it.

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Cold storage and other commercial freezers are usually monitored continuously and a record maintained of the temperature of the freezer so that compliance with cold storage specifications can be checked and authenticated.

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However, at a domestic level, and even at the level of small freezers in retail outlets, no such record is maintained and it is not always easy to assess the extent of de-frosting that may have taken place prior to the freezer functioning once more. The condition of frozen foods or other perishables that may have spoiled is often not known.

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Many prior art devices have been proposed to indicate when a freezer has failed to the extent that frozen food stored in the freezer could have thawed to an undesirable extent. Some of these are based on the principle that a solid body rests on or in the top of an already frozen liquid such that if the liquid thaws the solid body will fall to the bottom of the liquid container and will be easily visible as evidence that thawing has occurred. British Patent No 2,235,969 is an example of a simple device of the type whilst United States Patent No 4,144,532 is an example of a more sophisticated version of this type of device in which the weight closes an electric circuit when it falls to the bottom. A reverse principle is employed in United States Patent No 4,064,828 in which a buoyant indicator is locked within a frozen liquid and if the liquid thaws the buoyant indicator rises.

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Other devices simply operate on the locking of a frozen body of liquid in an upper position such that it flows downwards, or in one case laterally, if thawing takes place. The frozen body of liquid is generally created by freezing the liquid in the device with the latter in one orientation and then subsequently inverting the device so that the frozen body of liquid is then uppermost. Some of the devices choose to select liquids with different freezing points, and indeed some use multiple liquid indicators with different freezing points to indicate the degree of the freezer failure. Examples of

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these devices are German Patents 3,940,163 and 4,418,927 and United States Patents 4,114,443 and 4,941,425.

5 All of these devices are any one or more of relatively complicated, difficult to manufacture, or do not clearly indicate the failure as a result of a single colour being employed and only its position changing, or only the position of the solid item changing.

#### OBJECT OF THE INVENTION

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It is accordingly an object of the invention to provide a simple freezer failure indicator device which will be easy to see and the change in which will be quite obvious in the event of thawing taking place.

#### 15 SUMMARY OF THE INVENTION

In accordance with this invention there is provided a freezer failure indicator comprising a closed container defined by walls forming an internal cavity containing both a quantity of a first liquid having a freezing point selected so  
20 that it will be frozen at normal operating temperatures of a freezer with which it is to be used and a generally roughly equal quantity of a second liquid substantially immiscible with the first liquid and selected to remain in a liquid state at normal operating temperatures of the freezer, the two liquids being of distinctly different colours and wherein the walls of the container have an  
25 opaque zone and a transparent zone arranged to enable the first liquid to be pre-frozen within the opaque zone followed by orientating the container to render the second liquid visible through the transparent zone of the wall in which orientation the second liquid is displaced by the first liquid in the event that it thaws.

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Further features of the invention provide for the container to be of upright shape capable of being supported in either of two possible generally vertical orientations; for each end of the container to have an enlarged foot formation for supporting the container in an upright position on, for example, a shelf  
5 composed of rungs or alternatively for the container to have a support bracket or clip for supporting it on the inside wall of a freezer for example; for the first liquid be water or water, the freezing point of which has been modified by the addition of additives such as alcohol, salt or other freezing point depressants; and for the second liquid to be an organic liquid such as  
10 liquid paraffin, for example.

The opaque portion of the side walls preferably extends from one end of the container for about two-thirds to three quarters of the height of the container whilst the rest of the height is colourless. The first liquid, which is adapted to  
15 freeze, is preferably coloured red whilst the second liquid which is generally oil, is preferably coloured green. Obviously any other indicative colours may be chosen. The functioning of this indicator will be described in more detail hereunder.

20 In order that the invention may be more fully understood one embodiment thereof will now be described with reference to the accompanying drawings.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

25 In the drawings:-

Figure 1 is a sectional elevation of one embodiment of the invention;

Figure 2 is a similar sectional elevation illustrating the indicator in an  
30 inverted orientation;

Figure 3 is a similar sectional elevation but showing the indicator inverted once more after it has been subjected to freezing temperatures in order to prepare it for operation;

5        Figure 4 is an full elevation of the indicator showing the opaque and transparent, colourless zones and also indicating the appearance of the failure indicator after a failure has occurred; and,

10        Figure 5 is an isometric view showing one form of support for the indicator described with reference to Figures 1 to 4.

#### **DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS**

15        In the embodiment of the invention illustrated in Figures 1 to 4 the freezer failure indicator is a permanently closed container (1) formed of two parts of injection moulded plastics material the one part (2) being of opaque plastic, conveniently appliance white for example, and the other part (3) being of  
20        clear and colourless transparent plastics material. Each of the two parts (2) and (3) are of a right circular cylindrical shape having at its free end an integral flange (4) of sufficient dimensions to act as an end stop as will be further described below.

25        The two parts are configured such that the opaque extends for about two-thirds to three quarters of the overall height of the container and the two parts overlap somewhat to enable the two parts to be adhesively secured to each other in leak-proof manner or alternatively to be ultrasonically welded together or permanently secured together in any other way. Effectively, the container is thus opaque for about two-thirds to three quarters of its height as  
30        shown most clearly in Figure 4.

Prior to the two parts being permanently secured together, there is introduced into them a volume of water (5) which is coloured red and has its freezing point optionally modified to depress it if this is required for any particular reason. It is envisaged that for general use on a domestic level or by small retailers, the usual freezing point of water will be adequate. The volume of water fills about 35% of the height of the container.

Also introduced into the container is a similar volume of oil (6), in this case paraffin, which has been coloured green using suitable dye material. The oil is also present in an amount occupying about 35% of the height the container. The balance of the volume of the container indicated by numeral (7) is filled with air which accommodates the expansion and contraction of the volume of water when it freezes or thaws and also to avoid over flow of the liquids during manufacture. Whatever quantity of liquid is used it only has to be sufficient to fill the transparent zone of the container.

For use the freezer failure indicator described above may be provided with suitable indicia and instructions applied to the outer surface thereof to indicate the orientation of the container for the purposes of use in the manner described below.

In order to prepare the indicator for use it is introduced into a freezer in the orientation illustrated in Figure 2, ie with the opaque part (2) lowermost. The volume of water (5) will therefore freeze in the opaque end of the container. In order to render the indicator functional it is then inverted to the orientation illustrated in Figure 3 with the opaque part (2) uppermost and the frozen water (5) locked in position within it. The frozen water is thus held in an elevated position whilst the green coloured paraffin (6) rests in the lower transparent part (3). The green colour of the paraffin is thus visible through the transparent wall of the now lower part of the container thus indicating that there has been no harmful freezer failure.

In the event of freezer failure which results in the water (5) thawing, the water will fall down in the container and by virtue of its greater specific gravity will fall to the bottom of the body of oil by displacement. As soon as sufficient  
5 water has melted to disengage the entire body of frozen water from the container it will fall to the bottom displacing the paraffin. The red colour of the water, or if it has re-frozen, the red colour of the ice will be quite obvious to anybody viewing the indicator and such a condition is illustrated in Figure 4 and most noticeable in that there has been a distinct colour change from  
10 green to red. With white as the colour of the opaque part the colour of green or red is particularly noticeable.

In overall effect, therefore, the green colour of the paraffin will be visible if all has been well over a time period under review and the red colour of the  
15 water will be visible if the ice initially lodged in the upper end of the container has melted adequately to enable the water to fall and displace the green paraffin.

The indicator could be supported in any manner in a freezer but it is  
20 preferred to attach it to an internal wall of the freezer by means of a bracket or clip. In this manner the indicator does not occupy any significant potential storage space in the freezer and will not be knocked over or be in the way.

A simple device is shown in Figure 5 in which a clip (8) of channel shape in  
25 cross-section has a self-adhesive mounting pad (9) on the outside of its web portion (10). The free edges of the flanges (11) have inwardly directed lips (12) so that the indicator can be clipped into the channel and removed therefrom very easily. In this regard it is to be noted that the flanges (4) on the container itself will prevent the container from falling out in the event that  
30 the clip fails to engage the outside walls of the container adequately, the flanges thereby acting as stops.



The embodiment of the invention described above can be varied in many ways without departing from the scope hereof which is limited only to the use of the two different liquids in the general manner set forth. It will therefore be appreciated that this invention provides extremely simple yet effective freezer failure indicators which are simple to manufacture extremely simple use.

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**CLAIMS:**

1. A freezer failure indicator comprising a closed container (1) defined by walls forming an internal cavity containing both a quantity of a first liquid (5) having a freezing point selected so that it will be frozen at normal operating temperatures of a freezer with which it is to be used and a generally roughly equal quantity of a second liquid (6) substantially immiscible with the first liquid and selected to remain in a liquid state at normal operating temperatures of the freezer, the two liquids being of distinctly different colours and wherein the walls of the container have an opaque zone (2) and a transparent zone (3) arranged to enable the first liquid to be pre-frozen within the opaque zone followed by orientating the container to render the second liquid visible through the transparent zone of the wall in which orientation the second liquid is displaced by the first liquid in the event that it thaws.
2. A freezer failure indicator as claimed in claim 1 in which the container is of upright shape capable of being supported in either of two possible generally vertical orientations.
3. A freezer failure indicator as claimed in either one of claims 1 or 2 in which each end of the container has an enlarged foot formation (4) for supporting the container in an upright position.
4. A freezer failure indicator as claimed in any one of claims 1 to 3 in which the container has a support bracket or clip (8) for supporting it on the inside wall of a freezer.
5. A freezer failure indicator as claimed in any one of the preceding claims in which the first liquid is water or water, the freezing point of which has been modified by the addition of additives.

6. A freezer failure indicator as claimed in any one of the preceding claims in which the second liquid is an organic liquid.
- 5 7. A freezer failure indicator as claimed in any one of the preceding claims in which opaque portion of the side walls extends from one end of the container for about two-thirds to three quarters of the height of the container whilst the rest of the height is colourless.
- 10 8. A freezer failure indicator as claimed in any one of the preceding claims in which the first liquid is coloured red and the second liquid is coloured green.

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**AMENDED CLAIMS**

[received by the International Bureau on 31 July 2001 (31.07.01);  
original claim 1 amended; original claim 7 cancelled; remaining claims unchanged (2 pages)]

1. A freezer failure indicator comprising a closed container (1) defined by walls forming an internal cavity containing both a quantity of a first liquid  
5 (5) having a freezing point selected so that it will be frozen at normal operating temperatures of a freezer with which it is to be used and a generally roughly equal quantity of a second liquid (6) substantially immiscible with the first liquid and selected to remain in a liquid state at normal operating temperatures of the freezer, the two liquids being of  
10 distinctly different colours and wherein the walls of the container have an opaque zone (2) and a transparent zone (3), *the indicator being characterized in that the opaque zone of the container is formed from one injection moulded plastics part that forms about two thirds to three quarters of the height of the container and the transparent zone is*  
15 *formed from another injection moulded plastics part with the two plastic parts being secured together to form the container so as to enable the first liquid to be pre-frozen within the opaque zone followed by orientating the container to render the second liquid visible through the transparent zone of the wall in which orientation the second liquid is*  
20 *displaced by the first liquid in the event that it thaws so as to become visible through the transparent zone in place of the second liquid.*
2. A freezer failure indicator as claimed in claim 1 in which the container is of upright shape capable of being supported in either of two possible  
25 generally vertical orientations.
3. A freezer failure indicator as claimed in either one of claims 1 or 2 in which each end of the container has an enlarged foot formation (4) for supporting the container in an upright position.

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6. A freezer failure indicator as claimed in any one of the preceding claims in which the second liquid is an organic liquid.

7. Deleted

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8. A freezer failure indicator as claimed in any one of the preceding claims in which the first liquid is coloured red and the second liquid is coloured green.

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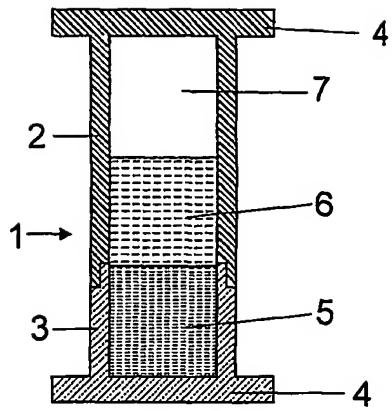


Fig 1

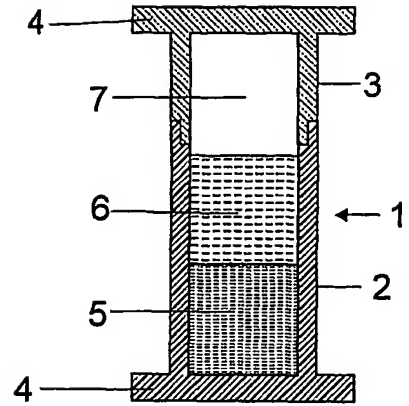


Fig 2

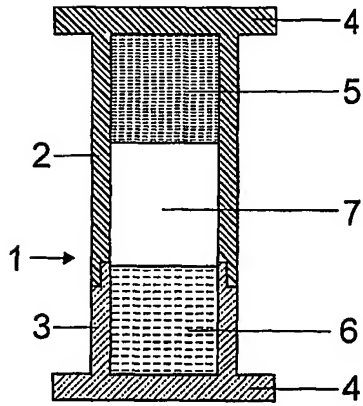


Fig 3

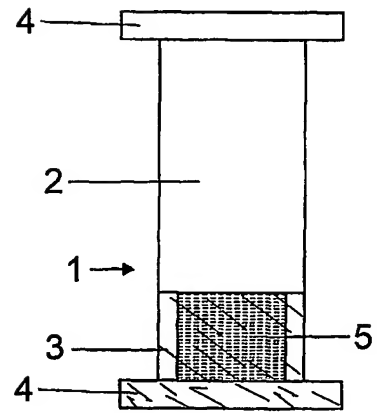


Fig 4

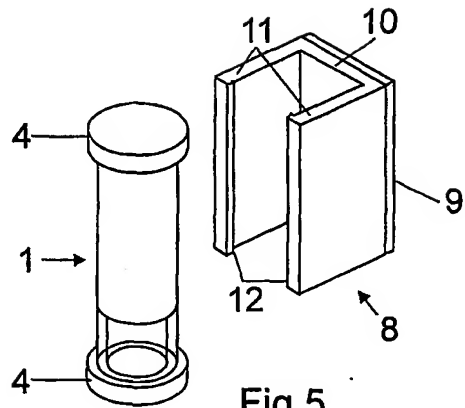


Fig 5

## INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/ZA 00/00240

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G01K11/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 740 136 A (COOL SARL) 30 October 1996 (1996-10-30) column 4, line 54 -column 6, line 39; figures 10-13	1,2,5-7
A	FR 2 632 405 A (SORGE ALAIN) 8 December 1989 (1989-12-08) page 2, line 15 -page 4, line 29; figures	1,2,7,8
A	FR 2 676 532 A (CODEX ETUDES) 20 November 1992 (1992-11-20) figures	1-5

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

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\*Z\* document member of the same patent family

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Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/ZA 00/00240

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0740136	A	30-10-1996	FR 2733589 A	31-10-1996
FR 2632405	A	08-12-1989	NONE	
FR 2676532	A	20-11-1992	NONE	